Information Request DTE 1-1

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please clarify the number of locations at which ambient sound levels were measured. Also, where a range of sound levels is given (i.e., "32 to 35 dBA"), please explain how sound measurements were reduced to a range and what the upper and lower ends of the decibel ranges represent.

Response:

Ambient sound levels measurements were taken at two locations (please see Attachment A):

- 1. Northeast property line intersection with existing cart path (A1)
- 2. 320' into the property, from Rte 140, and along the railroad tracks (A2)

Ambient noise levels were determined by taking noise readings every second over a one minute period and then averaging the readings for each of the above locations. The upper and lower ranges represent the highest and lowest averages for the two locations.

Information Request DTE 1-2

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please provide a scaled map showing sound measurement locations in relation to property lines, nearby homes, and current and future sound sources.

Response:

Please refer to Attachment A.

<u>Information Request DTE 1-3</u>

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please provide the distances from the existing Wachusett Substation to: (1) the location Designated as "Residence 1"; (2) the nearest property line; and (3) each of the nearest three homes.

Response:

Please refer to Attachment A. Residence 1 is the closest residence to Wachusett Substation

| Location | <u>Distance</u> |
|---|-----------------|
| Wachusett Substation to Residence 1 | approx 375' |
| Wachusett Substation to Residence 2 | approx 430' |
| Wachusett Substation to Residence 3 | approx 612' |
| Wachusett Substation to nearest property line | approx 5' |

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please provide the distance from the proposed transformers to: (1) the location designated as "Residence 1"; (2) the nearest property line; and (3) each of the nearest three homes.

Response:

Please refer to Attachment A.

| Location | <u>Distance</u> |
|---|-----------------|
| | |
| Transformer T1 to Residence 1 | approx 508' |
| Transformer T1 to Residence 2 | approx 545' |
| Transformer T1 to Residence 3 | approx 887' |
| Transformer T1 to nearest property line | approx 80' |
| Transformer T2 to Residence 1 | approx 472' |
| Transformer T2 to Residence 2 | approx 519' |
| Transformer T2 to Residence 3 | approx 870' |
| Transformer T2 to nearest property line | approx 45' |
| Transformer T3 to Residence 1 | approx 457' |
| Transformer T3 to Residence 2 | approx 635' |
| Transformer T3 to Residence 3 | approx 700' |
| Transformer T3 to nearest property line | approx 85' |
| Transformer T4 to Residence 1 | approx 608' |
| Transformer T4 to Residence 2 | approx 422' |
| Transformer T4 to Residence 3 | approx 675' |
| Transformer T4 to nearest property line | approx 55' |
| Transformer T5 to Residence 1 | approx 705' |
| Transformer T5 to Residence 2 | approx 740' |
| Transformer T5 to Residence 3 | approx 1025' |
| Transformer T5 to nearest property line | approx 130' |
| Transformer T6 to Residence 1 | approx 720' |
| Transformer T6 to Residence 2 | approx 715' |
| Transformer T6 to Residence 3 | approx 980' |
| Transformer T6 to nearest property line | approx 200' |
| Transformer T7 to Residence 1 | approx 700' |

Information Request DTE 1-4 continued

| Transformer T7 to Residence 2 | approx 767' |
|---|--------------|
| Transformer T7 to Residence 3 | approx 1066' |
| Transformer T7 to nearest property line | approx 90' |
| Transformer T8 to Residence 1 | approx 737' |
| Transformer T8 to Residence 2 | approx 700' |
| Transformer T8 to Residence 3 | approx 942' |
| Transformer T8 to nearest property line | approx 240' |

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please provide L_{90} sound levels at each of the sound measurement locations, for each monitored time period, as available.

Response:

| Location | <u>Date</u> | <u>Time</u> | <u>L₉₀ Reading</u> |
|---------------------------------|-------------|-------------|-------------------------------|
| | | | |
| Residence 1 | 5/15/03 | Daytime | 50.40 dBA |
| Residence 1 | 5/28/03 | Nighttime | 53.50 dBA |
| Property line/cart path (A1) | 5/15/03 | Daytime | 36.21 dBA |
| Property line/cart path (A1) | 5/28/03 | Nighttime | 32.56 dBA |
| 320' railroad tracks (A2) | 5/15/03 | Daytime | 45.92 dBA |
| 320' railroad tracks (A2) | 5/28/03 | Nighttime | 37.10 dBA |
| Edge of clearing/cart path (A3) | 5/15/03 | Daytime | 41.93 dBA |
| Edge of clearing/cart path (A3) | 5/28/03 | Nighttime | 39.90 dBA |

<u>Information Request DTE 1-6</u>

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please indicate all known sound sources that contributed to the Company's ambient measurements at and around Wachusett Substation.

Response:

The following noise sources contribute to the ambient noise levels:

- 1. Rte 140 vehicular traffic
- 2. Boston & Maine railroad traffic
- 3. Gates Brook
- 4. Animal noises emanating from the wetlands and surrounding bushes
- 5. Existing transformer T1 at Wachusett Substation

Information Request DTE 1-7

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please discuss whether 30 to 32 dBA respresents background noise levels near the Wachusett Substation, away from brooks, traffic, and existing substation noise. Please also discuss whether additional measurements would assist in determining ambient sound levels representative of quiet periods (e.g., L₉₀'s applicable to nearby residences).

Response:

The 30 to 32 dBA ambient noise levels are at the property lines near the closest residence and on the opposite side of the New England Power-owned parcel as indicated on Attachment A. The two locations were selected to provide an indication of the highest and lowest values along the property line. Additional measurements could be taken to confirm the validity of the range identified.

<u>Information Request DTE 1-8</u>

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please explain how "noise level from existing substation" was calculated.

Response:

Please refer to Attachment B, EDP-LAB 15 & Attachment C, Noise Control for Buildings and Manufacturing Plants, Chapter 1-10, section C, Short Method for Decibel Addition.

Information Request DTE 1-9

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please list the sources of noise that would exist during operation of the substation after completion of the proposed project.

Response:

In addition to the noise sources identified in (f), there will be seven more transformers (T2 through T8) as indicated in Attachment A.

Information Request DTE 1-10

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please provide the manufacturer's specification on the sound power level of the proposed low-noise transformers.

Response:

The Company requested proposals for the 345/115 kV transformers required for this project. Bids were received, evaluated and awarded. However, final release for engineering, design and construction has not been given since the permitting process is not completed. Nonetheless, the following information will answer this request:

- 1. Attachment D is National Grid's Engineering/Design Procedure Substation 30.0, 'Substation Engineering Power Transformer Preparing Specifications', page 16 shows National Electrical Manufacturers Association's table for standard sound levels for oil immersed power transformers. For the 268/258/448 MVA – 345/115 kV transformers the standard levels are 87/88/89 dBA, for the 30/40/50 MVA – 115/69 kV transformers the standard levels are 75/77/78 dBA.
- 2. Attachment E is a copy of the specification used to purchase transformers T5 & T6 (future transformers T7 & T8 are assumed to have identical characteristics). Page 3, section 8.0 shows that the sound levels required are 72/74/75 dBA. Attachment F is a copy of the nameplates for transformers T1 through T4.

Information Request DTE 1-11

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please explain why adding seven transformers creates an additional sound pressure level that is 60% (i.e. $10^{(2/10)}$) higher than would be obtained by adding five transformers.

Response:

The existing substation contains a single 30/40/50 MVA – 115/69 kV transformer. The proposed addition to the substation will be designed to accommodate a total of four 115/69 kV – 30/40/50 MVA (with sound levels of 69/71/72 dBA) transformers and four 345/115 kV – 448 MVA (with sound levels of 72/74/75 dBA) transformers. However, the substation will be built in phases as dictated by load growth. Under phase 1 there a total of four 115/69 kV transformers and two 345/115 transformers (addition of five transformers) is being proposed. Under a future phase 2, the remaining two 345/115 kV transformers will be added. The increase in sound levels associated with transformers T7 & T8 (adding two additional for a total of seven transformers) is a consequence of the installing the larger and higher sound level units.

Information Request DTE 1-12

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please provide the height(s) and elevations of relevant noise sources, the elevation of the Railroad embankment, the height of the noise monitoring station, and the height and elevation of the nearest homes west of the railroad embankment.

Response:

The 115/69 kV yard, housing transformers T1 through T4, will remain at elevation 473.5'. The height of transformers T1 through T4 to the top of their main tanks is 12'

The 345/115 kV yard, housing transformers T5 through T8, will be graded to elevation 471.5'. The height of transformers T5 through T8 to the top of their main tanks is 14.5'

The elevation of the railroad embankment along the substation fence varies from Elevation 482 to Elevation 486.

The noise monitor was held at chest height (approx 5' over grade) during measurements.

The elevation of residences 1, 2 & 3 were not measured as part of the survey the Company conducted of the site. Based on USGS topographic maps available to the Company, the approximate ground elevations at the residences are:

R1 – Elevation 482

R2 – Elevation 472

R3 – Elevation 492

All the houses are two stories with approximately roof heights of 20 to 24 feet.

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please predict noise levels at the nearest three homes; show calculations.

Response:

Please see Attachment G.

<u>Information Request DTE 1-14</u>

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please provide a narrative explanation of pages 2 through 4 of Exh. AJM-4, and provide a more legible copy or version of the Excel spreadsheet that was provided (pages 2,3).

Response:

Please see Attachment H.

The Company has developed an Excel spreadsheet that incorporates the method for calculating addition to ambient sound levels from a given sound source described in Attachments B & C.

The top half of the spreadsheet shows the predicted sound levels at Residence 1 after the addition of each transformer individually, while the second half shows the resulting ambient noise levels at the same location after the addition of each transformer

Information Request DTE 1-15

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Please discuss whether the new transformers would produce a "pure tone.".

Response:

Typical transformer noise is mostly due to core steel laminations undergoing elongation and contraction (magnetostriction) as magnetic flux through them varies. This magnetostriction is non-linear and independent of flux direction. Hence, noise is emitted in even multiples of the excitation frequency, i. e.: 120, 240, 360 Hz for a 60 Hz power system, with the 120 & 240 Hz components, typically, being the largest in magnitude.

However, the sound survey conducted by the Company indicates that noise from the transformers will be attenuated by the distance and physical barriers to the residences to a point where the energy of the single frequencies will exceed the energy of the ambient noise.

Please refer to the Molina testimony at 6, 7, and Exh. AJM-4.

Request:

Does West Boylston have a noise ordinance? If so, please provide a copy to the Department.

Response:

West Boylston does not have a noise ordinance.